Integrated Rate Laws

$$\ln \frac{[A]_t}{[A]_0} = -k \cdot t$$

$[A]_0$ - initial concentration

$[A]_t$ - concentration at time t

should give a straight line

$$\left[\ln [A]_t = -kt + \ln [A]_0 \right]$$ - 1st order

$$\left[\frac{1}{[A]_t} = -k \cdot t + \frac{1}{[A]_0} \right]$$ - 2nd order

$$\left[[A]_t = -kt + [A]_0 \right]$$ - 0 order

Half-life - is defined as the ~~time~~ time required for one-half of a reactant to react

$[A]_t = 0.5 [A]_0 \Rightarrow$ for half-life

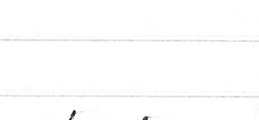
for 1st order $\rightarrow$ $$\left[\frac{0.693}{k} = t_{1/2} \right]$$ ($t_{1/2}$ time of half-life)

for 2nd order $\rightarrow$ $$\left[\frac{1}{k[A]_0} = t_{1/2} \right]$$

for 0 order $\rightarrow$ $$\left[\frac{[A]_t - 0.5[A]_0}{-k} \right] = t_{1/2}$$

- Generally as temperature increases, the reaction rate also increases
- E_a - activation energy is a minimum amount of energy required for reaction
- ! Large E_a results in small k indicating a decreased rate.

$$\left[\ln \frac{k_1}{k_2} = \frac{E_a}{R} \left(\frac{1}{T_2} - \frac{1}{T_1} \right) \right]$$ Arrhenius equation.



The Collision Theory Model

- In chemical reaction, bonds are broken and new bonds are formed. Molecules can only react if they collide with each other

Moreover, molecules must collide must with the correct orientation and with enough energy to cause bond breakage and formation

Transition Theory Model

- Energy of the particles is converted to potential energy during a collision.

Homework : p 716 : #34-38 even
#41-45 odd
#49, 50, 52, 88